Biosignature recognition and the integration of data sets over multiple scales of observation

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There are a number of different observational scales over which one may detect biosignatures. Examples of these scales are spatial distribution, temporal scale, and various electromagnetic spectral scales. The magnitude of the observation varies, depending upon the type of measurement scale in consideration, and a large signal (that is, high contrast of signal to background intensities) in one scale of observation does not necessarily correlate to the same magnitude response in some other scale of observation for the same sample.

The Center for Life Detection at JPL is interested in discovering the full range of chemical and structural biosignatures that can be present in sediment and rock. To that end, we have explored a number of methods and technologies that yield complementary data sets, which, considered together, can provide the evidence to make good statistical decisions about whether or not evidence for life is being detected in geological materials.

Here, I will present both chemical and structural data acquired at both various scales and various magnitudes and address some of the issues pertinent to the acquisition, handling and interpretation of these observations.